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CLAIMS

[Claim(s)]
[Claim 1]A texture acquisition method which acquires a texture of this subject from an image which photoed two or more subjects continuously, comprising:
The 1st procedure of selecting all the frames which a subject of relevance has projected for every subject.
Then, the 2nd procedure that chooses at least one frame from a selected frame.
The 3rd procedure that acquires a texture of a subject from the selected frame.

[Claim 2]A texture acquisition method acquiring a texture of those subjects from the one frame in the 3rd procedure in a texture acquisition method indicated to claim 1 when two or more subjects have projected on one frame.
[Claim 3]In a texture acquisition method indicated to claim 1 or 2, in the 2nd procedure. A subject registered into a memory measure which enumerates subjects in which a frame for texture acquisition is not determined is made into a processing object, Out of a frame which a subject of the processing object has projected, choose a frame and in the 3rd procedure. A texture acquisition method determining a subject which acquires a texture by making into a processing object a subject registered into the above-mentioned memory measure, and acquiring a texture of the subject.
[Claim 4]In a texture acquisition method indicated in any 1 paragraph of claims 1 thru/or 3, in the 1st procedure. A texture acquisition method recording a selected frame by recording information which specifies a frame which a subject projected, and information which specifies a frame [a subject] no longer projecting.
[Claim 5]A texture acquisition method choosing a frame in the 2nd procedure in a texture acquisition method indicated in any 1 paragraph of claims 1 thru/or 3 on the basis of a frame which a subject projected, or a frame [a subject] no longer projecting.
[Claim 6]A texture acquisition device which acquires a texture of this subject from an image which photoed two or more subjects continuously, comprising:
A means to select all the frames which a subject of relevance has projected for every subject.
Then, a means to choose at least one frame from a selected frame.
A means to acquire a texture of a subject from the selected frame.

[Claim 7]A texture acquisition device when two or more subjects have projected on one frame in a texture acquisition device indicated to claim 6, wherein a means to acquire a texture acquires a texture of those subjects from the one frame.
[Claim 8]A program for texture acquisition processings for making a computer perform processing used for realization of a texture acquisition method indicated in any 1 paragraph of claims 1 thru/or 5.
[Claim 9]A recording medium of a program for texture acquisition processings which recorded a program for making a computer perform processing used for realization of a texture acquisition method indicated in any 1 paragraph of claims 1 thru/or 5.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]A texture acquisition method and a device which acquire the texture of those subjects after this invention photos many subjects continuously as an image, A texture acquisition method and a device which enable it to reduce the number of sheets of the frame especially saved as a still picture about the program for texture acquisition processings used for realization of the texture acquisition method, and the recording medium of the program, It is related with the program for texture acquisition processings used for realization of the texture acquisition method, and the recording medium of the program.
[0002]
[Description of the Prior Art]The shape and color of the real world are incorporated as data of a computer, and various simulations become possible by reproducing the actual world on a computer.
[0003]the step which mainly acquires ** shape when incorporating the data of the real world, the step which acquires the color and the pattern on the surface of **, and ** -- it comprises a step which unifies them and generates one model.
[0004]Surface color and pattern are called a "texture" in the field of image processing or computer graphics.
[0005]Although there is also the method of photoing as a still picture for every subject in the step which acquires the texture of above-mentioned **, when a large number [a subject] then, it takes time and effort dramatically.
[0006]In order to solve this, when taking a photograph continuously as an image on videotape etc. and sticking a texture on a subject at the step of above-mentioned **, the frame which the subject has projected into the image is detected, The frame is saved as a still picture, the shape obtained by the still picture at the step of above-mentioned ** is applied, and how to acquire a texture can be considered.
[0007]For example, when it is going to acquire the texture of the urban area which many buildings are built and is located in a line, large laborsaving can be attained by acquiring a texture from the aerial-photographing image using a helicopter etc., as shown in drawing 10 rather than photoing one texture [one] of the upper surface of each building (refer to the following literature).
[0008]* I.Miyagawa,S.Nagai,K.Sugiyama,Shape Recovery from Aerial Imagesusing Factorization Method with Sensor Information,ACCV2000 * Japanese-Patent-Application-No. 11-268096 Item

About "the recording medium which memorized a three-dimensional information instrumentation method, a device, and its method", and the side, a building is photoed from the camera with which the car was equipped, and there is the method of acquiring a texture from the image (refer to the following literature).
[0009]* Hiroshi Kawasaki, Tomoyuki Yatabe, Katsushi Ikeuchi, and Masao Sakauchi, "Automatic generation of the three-dimensional city from an Omni video camera", Computer vision and image media . 119-4-1999.11.17, Information Processing Society of Japan *M.Uehara and H.Zen,

and "Building a Digital Town:From Digital Map to 3DMap by Mobile. Observation", The Second International Symposium onMized Reality (ISMR2001), March and 2001. -- in these references. When acquiring a texture, the frame (it is called an optimal frame) with which the subject is most reflected in the center of a picture is searched out of the photoed image (it usually searches automatically from the position of a subject and a camera, or direction), It saves as a still picture (it is called an optimal frame picture), and the method of starting the texture of a subject is shown by projecting into a picture the building model created at the step of above-mentioned **.

[0010]The block configuration of the three dimensional object model preparing system 1 which follows this conventional system at drawing 11 is illustrated.
[0011]What ten are a subject database among a figure and manages the information on the position data of a subject, etc., What 11 is a video data base and manages the photoed image, What 12 is an optimal frame retrieval device and searches an optimal frame, What 13 is a frame list for texture acquisition, and manages the information which is an optimal frame, for every subject, What 14 is an optimal frame acquisition device and acquires the picture of an optimal frame from the video data base 11, What manages the optimal frame picture which 15 is an optimal frame image database and was acquired by the optimal frame acquisition device 14, What 16 is a shape model data base and manages the geometric model of a subject, 17 is a texture **** device, and from an optimal frame picture and the geometric model of a subject, what starts the texture of a subject, and 18 are texture image databases, and manage the information on the texture started by the texture **** device 17.
[0012]According to the composition of this drawing 11, the three dimensional object model preparing system 1 according to a conventional system, When acquiring a texture, the optimal frame by which the subject is most reflected in the center of a picture is searched out of the photoed image, and it saves as a still picture, and it is processing by projecting the geometric model of a subject on the still picture so that the texture of a subject may be started.
[0013]When sticking a texture from a video frame by a help, the invention which reduces the work is indicated by JP,8-185544,A (name of an invention : "computer graphic making system and method for controlling the same").
[0014]To JP,7-73300,A (name of an invention : "ultrasonographic image signal processor and ultrasonographic image signal processing system"), a three-dimensional model and a texture are obtained from a medical picture, and the invention which compounds them is indicated.
[0015]
[Problem(s) to be Solved by the Invention]However, if the method of the conventional technology mentioned above is followed, although the time and effort for acquisition of a still picture will be reduced, since each frame is saved as a still picture from the medium by which the image was recorded, when a large number [a subject], there is a problem of needing a big saved area.
[0016]For example, when each frame of a Hi-Vision image is saved as a still picture, since the picture of one sheet is abbreviation 2,000x1,000=2,000,000 pixel, it needs about 7 megabytes of storage area in a Tiff format.
[0017]Since 30 frames is photoed in 1 second, when a Hi-Vision image saves all the frames as a still picture, for example from the photographed image for 10 minutes, it needs about 126 G bytes of storage area. Though only the optimal frame picture of each subject is saved, since nearly 1000 buildings are photoed, having taken aerial photos of a short time also needs a too big storage area, for example.
[0018]In the invention indicated to JP,7-73300,A mentioned above. The method of sticking on one model the texture obtained from the multiple frame is described, Although aimed at the case where two or more subjects are reflected in one frame, in the invention indicated to JP,10-111934,A (name of an invention : "three-dimensional geometric model preparation method and medium"), The purpose is to choose the model acquisition technique individually for every subject, and does not solve the above-mentioned technical problem.
[0019]This invention was made in view of this situation, and is ****. When taking the composition which acquires the texture of those subjects after the purpose photos a subject

continuously as an image, it is offer of the new texture acquisition art which enables it to reduce the number of sheets of the frame saved as a still picture.

[0020]
[Means for Solving the Problem]In order to solve the above-mentioned technical problem, this invention realizes reducing number of sheets of a picture to save by acquiring a texture of those subjects from a picture for one frame in which two or more subjects are reflected.
[0021]Since there is no big change in a range actually projected also by a picture which got mixed up several frames from an optimal frame, acquisition of a texture is possible enough.
[0022]From now on, in this invention, a frame which acquires a texture of each subject is not limited to an optimal frame, frames which can acquire a texture are enumerated, and composition of choosing a frame which can acquire a texture of as many subjects as possible in common within the limits of it will be taken.
[0023]Instead of the optimal frame retrieval device 12 with which composition is specifically provided by this invention conventionally which was shown in drawing 11, as shown in drawing 1, While having three devices called the frame range deciding device 20, the intensive frame detection device 22, and the with device 23 corresponding to an intensive frame, Composition provided with the texture acquirable range list 21 and two lists called the correspondence undecided list 24 as a storage area for saving an output of those devices is taken.
[0024]In this invention constituted in this way, the frame range deciding device 20 determines the range of a frame which can acquire a texture, and outputs the result to the texture acquirable range list 21.
[0025]For example, information which can specify a frame when a subject projects even on sufficient state for texture acquisition (it is called a frame-in), and a frame until the state finishes (it is called a frame-out) is recorded on the texture acquirable range list 21.
[0026]Next, the intensive frame detection device 22 determines a frame which acquires a texture using information on the texture acquirable range list 21. That is, at least one frame is chosen from a frame-in to all the subjects before a frame-out. It chooses so that a total of a frame eventually used for acquisition of a texture may decrease on the occasion of this selection.
[0027]Then, the with device 23 corresponding to an intensive frame compares information on the texture acquirable range list 21, enumerates all subjects that acquire a texture from a frame which the intensive frame detection device 22 determined, and writes a result of the listing in the frame list 13 for texture acquisition.
[0028]A subject enumerated by making it such is recognized that matching with a frame for texture acquisition ended, and is deleted from the correspondence undecided list 24. This correspondence undecided list 24 is referred to from the intensive frame detection device 22 and the with device 23 corresponding to an intensive frame, and is the target of search as a list of subjects with the necessity for texture acquisition at the time of each processing.
[0029]A result of the above processing is recorded on the frame list 13 for texture acquisition, and, as for next processing, acquisition of a texture is performed like a conventional system.
[0030]Thus, according to this invention, when photoing many subjects continuously and acquiring a texture of a subject from the image, number of sheets of a frame saved as a still picture from picture image data can be reduced, and, thereby, a storage area can be saved.
[0031]According to this invention, since it said that a texture of two or more subjects was acquirable from one frame whose number of pictures to treat decreases at once, simplification of processing which acquires a texture is also expectable.
[0032]
[Embodiment of the Invention]Hereafter, according to an embodiment, this invention is explained in detail.
[0033]When this invention acquires the texture of many subjects, it is applicable to reduction of the frame number as a still picture to be saved.
[0034]As a using state assumed, the image of the urban area of a wide area is photoed from the sky, and the case where the roof texture of many buildings is acquired collectively, the case

where it acquires for a short time by making into an image the texture of the terrestrial installation object which stands in a row in large numbers and irregularly with a mounted camera, etc. are mentioned.
[0035]In order to photo a subject continuously, the case where both the subject, and photography both [one of the two or] are moving can be considered, but in the case of which, this invention is applicable.
[0036]In such a using state, it is explained concretely how this invention is realized.
[0037]First, the picture image data generally used is explained in advance of explanation of this invention.
[0038]Although there is NTSC (National TV Standards Committee) as a video signal system of the television generally used in Japan and the U.S., in NTSC, 30 frames is displayed in 1 second. This is the same also with the Hi-Vision image which is the high resolution version of NTSC.
[0039]The device which records such an image has many things with the function which shakes the sequence number called a time code at each frame. A time code comprises a part, a second, and a frame number at the time of the recorded time. For example, if it is the 10th frame for 15:03 20 seconds, since a frame number begins from 00, it will become the time code 15:03:20:09.
[0040]As a standard of a time code, there are "C98.12:time and control code for video and audio tape for 525 / 30 television System" which is U.S. standards.
[0041]Although there is MPEG (Moving Picture Experts Group) as a format currently widely used by digital image media, At MPEG, the signal (a system clock reference, abbreviated to SCR) for aiming at video, an audio, and a time synchronization is inserted at the interval (or interval shorter than it) which is 700 milliseconds.
[0042]Therefore, also in the image of MPEG, it is possible to match each frame with real time.
[0043]In the following explanation, it shall also match with actual time by the number (frame number) being continuously shaken at each frame of an image, and making this frame number into a time code, if required.
[0044]As shown in drawing 1, in the three dimensional object model preparing system 1 possessing this invention. While taking three devices called the frame range deciding device 20, the intensive frame detection device 22, and the with device 23 corresponding to an intensive frame instead of the optimal frame retrieval device 12 with which composition is provided conventionally which was shown in drawing 11, The composition provided with the texture acquirable range list 21 and two lists called the correspondence undecided list 24 as a storage area for saving the output of those devices is taken.
[0045]The frame range deciding device 20 and the intensive frame detection device 22 which are prepared here that this invention should be realized, and the with device 23 corresponding to an intensive frame, It specifically realizes by a computer program and these computer programs can be stored in a recording medium with suitable semiconductor memory etc. which a computer can read.
[0046]In following composition conventionally, although the frame list 13 for texture acquisition will manage a correspondence relation with the optimal frame by which a subject and its subject are most reflected in the center of a picture, When following this invention, a correspondence relation with the frame used for acquisition of the texture of a subject and its subject will be managed.
[0047]The frame range deciding device 20 becomes final and conclusive the range of the frame which can acquire a texture for every subject.
[0048]When a camera is moved and the subject is being photoed continuously, a subject begins to be reflected from a direction of movement, it comes to project on the center of a frame gradually, and an image from which it separates from a frame is photoed after that.
[0049]The future and frame range deciding device 20 is, specifying a frame number (time code) in case a subject's carries out a frame-in, and a frame number (time code) in case a subject's carries out a frame-out for example, The range of the frame which can acquire the texture of the subject is become final and conclusive for every subject.
[0050]As the texture acquirable range list 21 manages the information on the range of the frame

which can acquire the texture become final and conclusive by the frame range deciding device 20 (preservation) and shows it to drawing 2, It matches with ID of a subject and a time code in case the subject carries out a frame-in, and a time code in case the subject carries out a frame-out are managed.

[0051]The intensive frame detection device 22 detects the frame (since it will be used for acquisition of the texture of two or more subjects, it is called an intensive frame) used for acquisition of a texture.

[0052]The with device 23 corresponding to an intensive frame determines with which intensive frame a texture is acquired for every subject, and registers it into the frame list 13 for texture acquisition.

[0053]The correspondence undecided list 24 manages a list of the subject in which the frame used for acquisition of a texture is not determined.

[0054]For example, as a subject, when there are "A, B, C, D, E, F", the correspondence undecided list 24 manages that there are "A, B, C, D, E, F" as an initial value as a subject in which the frame used for acquisition of a texture is not determined, as shown in drawing 3 (a).

[0055]And when the frame for texture acquisition of "A, B" is determined according to processing of the intensive frame detection device 22 mentioned later and the with device 23 corresponding to an intensive frame. As shown in drawing 3 (b), as a subject in which the frame used for acquisition of a texture is not determined, When it manages and the frame for texture acquisition of "C, D" is determined after it, that there are "C, D, E, F", As shown in drawing 3 (b), as a subject in which the frame used for acquisition of a texture is not determined, When it manages that there are "E, F" and the frame for texture acquisition of "E, F" is determined after it, as shown in drawing 3 (b), it manages that the frame used for acquisition of a texture about all the subjects was determined.

[0056]The example of 1 embodiment of the process flow which the frame range deciding device 20 performs to drawing 4 is illustrated, the example of 1 embodiment of the process flow which the intensive frame detection device 22 performs to drawing 5 is illustrated, and the example of 1 embodiment of the process flow which the with device 23 corresponding to an intensive frame performs to drawing 6 is illustrated.

[0057]Next, according to these process flows, this invention is explained in detail. First, the processing which the frame range deciding device 20 performs is explained.

[0058]When the frame range deciding device 20 answers the preparing request of the texture acquirable range list 21 and is started, as shown in the process flow of drawing 4, it is Step 1 first, When judging whether it is having ended processing of all the frames and judging not having ended processing of all the frames, it progresses to Step 2 and one frame is chosen from unsettled frames in order of a time code.

[0059]Then, the photographing area of the frame which took out the position of a camera and direction corresponding to the time code which the selected frame points out, and chose them at continuing Step 4 according to the position of the taken-out camera and direction is computed by referring to the video data base 11 at Step 3.

[0060]Then, at Step 5, when judging whether it is having ended processing to all the subjects and judging having ended processing to no subjects, it progresses to Step 6 and one unsettled subject is chosen. Then, it is judged whether it is existing in the photographing area which the selected subject computed at Step 4 by referring to the subject database 10 at Step 7.

[0061]When judging that the selected subject exists in a photographing area by this judging process, When progressing to Step 8, judging whether it is that the subject has already carried out the frame-in and judging not having carried out a frame-in, After registering the frame-in time of the subject chosen as the texture acquirable range list 21 according to the time code of the frame followed and chosen as Step 9, it returns to Step 5 in order to progress to processing of the following subject. And when judging having already carried out the frame-in at Step 8, it returns to Step 5 promptly, without processing Step 9 in order to progress to processing of the following subject.

[0062]When judging that the selected subject does not exist in a photographing area by the judging process of Step 7 on the other hand, When progressing to Step 10, judging whether it is that the subject has already carried out the frame-out and judging not having carried out a frame-out, After registering the frame-out time of the subject chosen as the texture acquirable range list 21 according to the time code of the frame followed and chosen as Step 11, it returns to Step 5 in order to progress to processing of the following subject. And when judging having already carried out the frame-out at Step 10, it returns to Step 5 promptly, without processing Step 11 in order to progress to processing of the following subject.

[0063]Thus, when judging having ended processing of all the subjects about the selected frame at Step 5 by repeating processing of Step 5 thru/or Step 11, it returns to Step 1 in order to progress to processing of the following frame.

[0064]And at Step 1, when judging having ended processing about all the frames, it judges that creation of the texture acquirable range list 21 was completed, and processing is ended.

[0065]For example, in acquiring the upper surface texture of a building from the sky with an aerial-photographing image, a position measuring device and a rotation measuring device are carried in a helicopter, and it records the position of the camera of each time, and direction at the time of photography.

[0066]In response, the frame range deciding device 20 computes the photographing area of each frame by using time as a key and comparing with the time code of each frame the position of a camera and data of direction which were recorded. And the position of the building which is a subject is acquired from a map etc., by comparing with the photographing area of each frame, the frame-in of each building and the time (time code) of a frame-out are obtained, and it is registered into the texture acquirable range list 21.

[0067]Thus, as shown in drawing 2, the frame-in for every subject and the time (time code) of a frame-out will be registered into the texture acquirable range list 21.

[0068]The features, such as not the position of a subject but contour shape of a subject and color, are saved here, Image recognition is processed to each frame, feature extraction is performed, and obtaining the time (time code) of a frame-in and a frame-out by comparing with the feature of each subject is also considered.

[0069].To "I.Miyagawa,S.Nagai,K.Sugiyama,"The Reconstruction from HybridFeature Points using Factorization Method" ISPRS2000." When using the technique of acquiring not only a texture but model geometry from video so that it may be indicated, in accordance with the time of model geometry creation, the time (time code) of a frame-in and a frame-out can be detected.

[0070]Next, according to the process flow of drawing 5 and drawing 6, the processing which the intensive frame detection device 22 and the with device 23 corresponding to an intensive frame perform is explained.

[0071]Processing in which these devices are as small a number as as a whole possible of frames, and take and spill the texture of all the subjects and it acquires that there is nothing will be performed.

[0072]When the intensive frame detection device 22 answers the preparing request of the frame list 13 for texture acquisition and is started, as shown in the process flow of drawing 5, it is Step 1 first, Smallest frame number i is chosen out of an unsettled frame number (when the following processings are performed, it becomes finishing processing the frame number).

[0073]At then, the step 3 which chooses the one unsettled subject j out of the subject registered into the correspondence undecided list 24 at Step 2, and continues. It is judged whether it is that frame number i is registered into the texture acquirable range list 21 as a frame number at the time of the frame-out of the subject j (time code).

[0074]When judging that frame number i is not registered as a frame number at the time of the frame-out of the subject j (time code) according to this judging process, When progressing to Step 4, judging whether it is having chosen all the subjects registered into the correspondence undecided list 24 and judging having chosen no subjects, It returns to Step 2 that the following subject should be chosen, and when judging having chosen all the subjects, it progresses to Step 5 and it is judged whether it is that frame number i is the last frame number.

[0075]And when judging that frame number i is not the last frame number according to this judging process. It progresses to Step 6, and after ***************ing one value of frame number i and setting up all the subjects registered into the correspondence undecided list 24 unsettled at continuing Step 7, it returns to Step 2 that processing same about the frame number i+1 which **************ed should be carried out.

[0076]At the time of on the other hand judging that frame number i is registered as a frame number at the time of the frame-out of the subject j (time code) at Step 3, and Step 5. When judging that frame number i is the last frame number, after progressing to Step 8 and setting up the last frame number i-1 as a number of the frame for texture acquisition, control is passed to the with device 23 corresponding to an intensive frame at continuing Step 9.

[0077]Namely, the intensive frame detection device 22 about the subject "A, B, C, D, E, F" registered into the correspondence undecided list 24, for example. When the frame-in of a gestalt and the time (a time code, i.e., a frame number) of a frame-out as shown in drawing 7 are registered into the texture acquirable range list 21, After detecting the frame-out time of the subject A and setting up the last frame number ** as a frame number for texture acquisition by **************ing one value of frame number i according to this, it processes so that control may be passed to the with device 23 corresponding to an intensive frame.

[0078]If control is passed from the intensive frame detection device 22, as shown in the process flow of drawing 6, first, the with device 23 corresponding to an intensive frame will be Step 1, and will set to I the frame number of the frame for texture acquisition set up by the intensive frame detection device 22. Then, the one unsettled subject j is chosen out of the subject registered into the correspondence undecided list 24 at Step 2.

[0079]At then, the step 4 which acquires time code (frame number) F_{in} of the frame-in of the selected subject j, and continues from the texture acquirable range list 21 at Step 3. Time code (frame number) F_{out} of the frame-out of the selected subject j is acquired from the texture acquirable range list 21.

[0080]Then, it is judged whether it is that the expression of relations $F_{in}<=I<=F_{out}$ is materialized at Step 5 between frame number I of the frame for texture acquisition, frame number F_{in} of the acquired frame-in, and frame number F_{out} of the acquired frame-out.

[0081]When judging that the expression of relations "$F_{in}<=I<=F_{out}$" is materialized by this judging process, It progresses to Step 6, and the subject j is deleted from the correspondence undecided list 24, and frame number I of the frame for texture acquisition is registered into the frame list 13 for texture acquisition as a frame for texture acquisition of the subject j at continuing Step 7.

[0082]Then, it is judged whether it is having chosen all the subjects registered into the correspondence undecided list 24 at Step 8. On the other hand, when judging that the expression of relations "$F_{in}<=I<=F_{out}$" is not materialized at Step 5, without processing Steps 6 and 7, it progresses to Step 8 promptly and it is judged whether it is having chosen all the subjects registered into the correspondence undecided list 24.

[0083]And when judging not having chosen all the subjects registered into the correspondence undecided list 24 by the judging process of this step 8. When judging having returned to Step 2 that the following subject should be processed, and having chosen all, When progressing to Step 9, judging whether it is that the correspondence undecided list 24 became empty and judging having become empty, it judges that creation of the frame list 13 for texture acquisition was completed, and processing is ended.

[0084]On the other hand, when judging that the correspondence undecided list 24 is not empty at Step 9, When progressing to Step 10, judging whether it is that frame number I is the last frame number and judging that it is the last frame number, When judging that creation of the frame list 13 for texture acquisition was completed, ending processing and judging that it is not the last frame number, it progresses to Step 11 and control is returned to the intensive frame detection device 22.

[0085]Thus, the with device 23 corresponding to an intensive frame, When the frame-in of a gestalt and the time (a time code, i.e., a frame number) of a frame-out as shown in drawing 7 are registered into the texture acquirable range list 21, When the frame of ** shown in a figure with the intensive frame detection device 22 is set up as a frame for texture acquisition, While registering that the frame for texture acquisition of the subjects A and B becomes frame ** into the frame list 13 for texture acquisition, the subjects A and B are deleted from the correspondence undecided list 24, and control is returned to the intensive frame detection device 22.

[0086]If the following processings are concretely explained according to drawing 7, in response, the intensive frame detection device 22, It is **************ing one value of frame number i shortly by making into a processing object the subject "C, D, E, F" registered into the correspondence undecided list 24, As shown in drawing 7, the frame-out time of the subject C is detected, the last frame number ** is set up as a frame number for texture acquisition according to this, and control is passed to the with device 23 corresponding to an intensive frame.

[0087]And in response, the with device 23 corresponding to an intensive frame, While registering that the frame for texture acquisition of the subjects C and D becomes frame ** into the frame list 13 for texture acquisition, the subjects C and D are deleted from the correspondence undecided list 24, and control is returned to the intensive frame detection device 22.

[0088]And in response, the intensive frame detection device 22, It is **************ing one value of frame number i shortly by making into a processing object the subject "E, F" registered into the correspondence undecided list 24, As shown in drawing 7, the frame-out time of the subject E is detected, the last frame number ** is set up as a frame number for texture acquisition according to this, and control is passed to the with device 23 corresponding to an intensive frame.

[0089]And in response, the with device 23 corresponding to an intensive frame, While registering that the frame for texture acquisition of the subjects E and F becomes frame ** into the frame list 13 for texture acquisition, by deleting the subjects E and F from the correspondence undecided list 24, it judges that the correspondence undecided list 24 became empty, and processing is ended.

[0090]The sky which a building is built and is located in a line about the processing explained above is photoed by helicopter, and the case where the frame which acquires a texture is chosen is concretely explained using drawing 8.

[0091]As shown in drawing 8, the range reflected in a frame according to advance of a helicopter shifts ahead little by little. If the frame is followed in 1, 2, 3, ..., order, the building A will carry out a frame-out with the frame 2 first.

[0092]About each subject, the intensive frame detection device 22 is that the target frame number confirms whether register with the texture acquirable range list 21 as a number at the time of a frame-out, and, specifically, detects a frame-out. And detection of a frame-out will determine the frame 1 in front of that as a frame for texture acquisition.

[0093]Next, the with device 23 corresponding to an intensive frame selects the building which acquires a texture, and writes out the result from the frame 1 determined as a frame for texture acquisition to the frame list 13 for texture acquisition. It is judged by referring to the texture acquirable range list 21 whether a texture is acquirable from the frame 1.

[0094]In the example of drawing 8, the frame 1 is recorded on the frame list 13 for texture acquisition as a frame for texture acquisition to the building A and the building B.

[0095]In processing to the above, since the frame for texture acquisition was determined about the building A and the building B, the building A and the building B are deleted from the correspondence undecided list 24.

[0096]It will be put into all the subjects by the correspondence undecided list 24 at the time of initialization. that is, -- explanation -- using -- **** -- an example -- being shown -- if -- correspondence -- undecided -- a list -- 24 -- initialization -- the time -- the contents -- [-- A -- B -- C -- D -- E -- F --] -- it is -- the following -- explaining -- as -- processing -- an end -- by -- [-- A -- B -- C -- D -- E -- F --] -- -> -- [-- C -- D -- E -- F --] -- -> -- [-- E -- F --] -- -> -- [--] -- the contents -- changing -- ******** .

[0097]In order to determine the following frame for texture acquisition, control is again returned to the intensive frame detection device 22, and the intensive frame detection device 22 confirms again whether the frame-out has occurred one by one from the frame 3. Since the generating

check of a frame-out is performed for the subject currently enumerated by the correspondence undecided list 24, the building A and the building B where matching of the frame was already performed are removed from the list, and become the outside of an object.
[0098]In the example of drawing 8, the building C is carrying out the frame-out in the frame 4. Therefore, the intensive frame detection device 22 chooses the frame 3 as a frame for texture acquisition.
[0099]Thus, by holding only the subject in which the frame for texture acquisition is not determined as the correspondence undecided list 24, choosing an excessive frame by it being lost that matching takes an unnecessary subject into consideration is lost, and there is an effect which reduces the number of the whole frames.
[0100]Hereafter, processing is performed like the time of the frame 1. Although the result of this processing will be accumulated in the frame list 13 for texture acquisition by the with device 23 corresponding to an intensive frame, the final result of the frame list 13 for texture acquisition in the example of drawing 8 becomes like drawing 9.
[0101]As shown in drawing 9, five frames existed in the image in all, but it turns out that the frame actually used for logging of a texture can be managed with three sheets.
[0102]In the example of an embodiment explained above, when the frame-out occurred, the method of adopting the frame in front of that was used, but when a frame-in occurs, it is also possible to use the method of adopting the frame just behind that.
[0103]Enumerating all the subjects included in the frame, and changing the combination of a frame to each frame, as other embodiments, it is the combination which can cover all the subjects, and it is also possible to also use the method of looking for what has the few number of frames.
[0104]Since it does not need the view of a frame-in and a frame-out in using this method, it is effective when the frame-in of a subject and a frame-out occur frequently.
[0105]
[Effect of the Invention]Thus, according to this invention, when photoing many subjects continuously and acquiring the texture of a subject from the image, the number of sheets of the frame saved as a still picture from picture image data can be reduced, and, thereby, a storage area can be saved.
[0106]According to this invention, since it said that the texture of two or more subjects was acquirable from one frame whose number of the pictures to treat decreases at once, simplification of the processing which acquires a texture is also expectable.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is an example of 1 embodiment of this invention.
[Drawing 2]It is an example of 1 embodiment of a texture acquirable range list.
[Drawing 3]It is an explanatory view of a correspondence undecided list.
[Drawing 4]It is an example of 1 embodiment of the process flow which a frame range deciding device performs.
[Drawing 5]It is an example of 1 embodiment of the process flow which an intensive frame detection device performs.
[Drawing 6]It is an example of 1 embodiment of the process flow which the with device corresponding to an intensive frame performs.
[Drawing 7]It is a processing explanatory view of the example of an embodiment.
[Drawing 8]It is a processing explanatory view of the example of an embodiment.
[Drawing 9]It is an explanatory view of the frame list for texture acquisition.
[Drawing 10]It is an explanatory view of texture acquisition processing.
[Drawing 11]It is an explanatory view of conventional technology.
[Description of Notations]
10 Subject database
11 Video data base
12 Optimal frame retrieval device
13 The frame list for texture acquisition
14 Optimal frame acquisition device
15 Optimal frame image database
16 Shape model data base
17 Texture **** device
18 Texture image database
20 Frame range deciding device
21 A texture acquirable range list
22 Intensive frame detection device
23 A with device corresponding to an intensive frame
24 Correspondence undecided list

[Translation done.]

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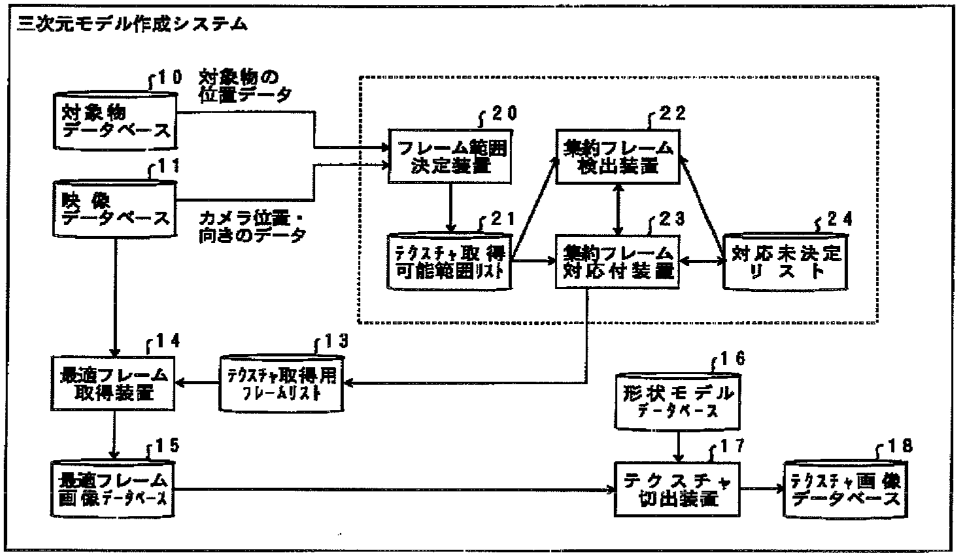
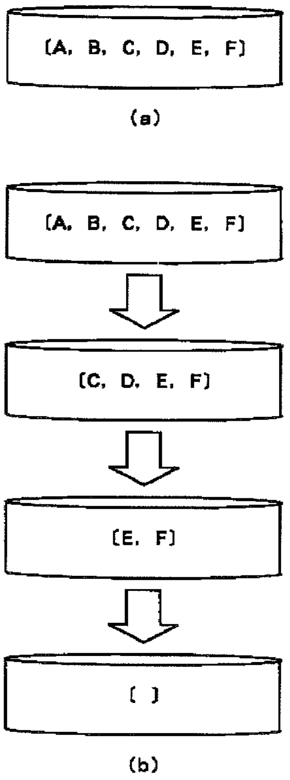
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]


三次元モデル作成システム
10
対象物データベース
対象物の位置データ
11
映像データベース
カメラ位置・向きのデータ
20
フレーム範囲決定装置
21
テクスチャ取得可能範囲リスト
22
集約フレーム検出装置
23
集約フレーム対応付装置
24
対応未決定リスト
13
テクスチャ取得用フレームリスト
14
最適フレーム取得装置
15
最適フレーム画像データベース
16
形状モデルデータベース
17
テクスチャ切出装置
18
テクスチャ画像データベース

[Drawing 3]



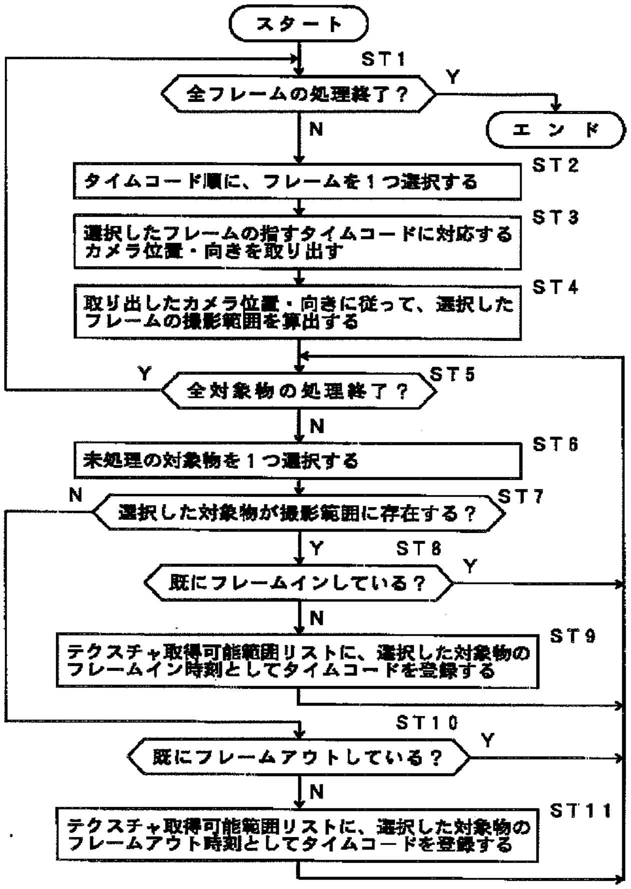
[Drawing 9]

対象物	テクスチャ取得用フレーム
A	1
B	1
C	3
D	3
E	5
F	5

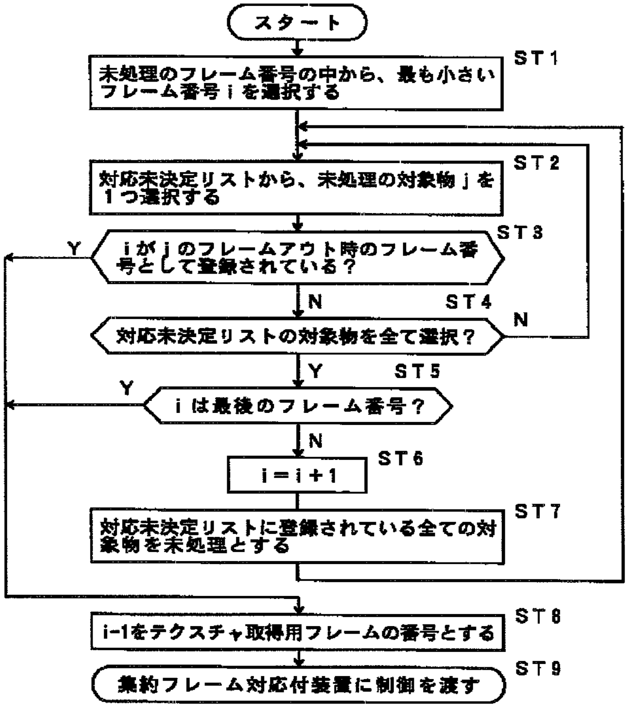
[Drawing 2]

対象物ID	フレームイン時刻(タイムコード)	フレームアウト時刻(タイムコード)
A	13:04:02:20	13:35:04:01
B	12:58:13:00	13:03:47:20
⋮	⋮	⋮
Z	15:14:29:11	15:25:54:35

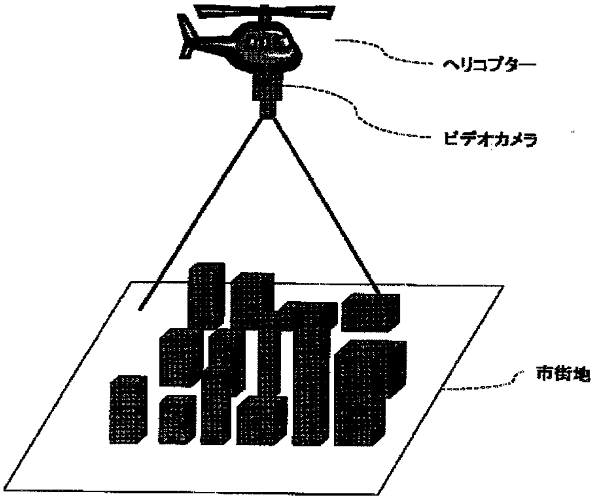
[Drawing 4]


スタート
ST1
全フレームの処理終了？
Y
エンド
N
ST2
タイムコード順に、フレームを１つ選択する
ST3
選択したフレームの指すタイムコードに対応するカメラ位置・向きを取り出す
ST4
取り出したカメラ位置・向きに従って、選択したフレームの撮影範囲を算出する
Y
ST5
全対象物の処理終了？
N
ST6
未処理の対象物を１つ選択する
N
ST7
選択した対象物が撮影範囲に存在する？
Y
ST8
既にフレームインしている？
Y
N
ST9
テクスチャ取得可能範囲リストに、選択した対象物のフレームイン時刻としてタイムコードを登録する
ST10
既にフレームアウトしている？
Y
N
ST11
テクスチャ取得可能範囲リストに、選択した対象物のフレームアウト時刻としてタイムコードを登録する

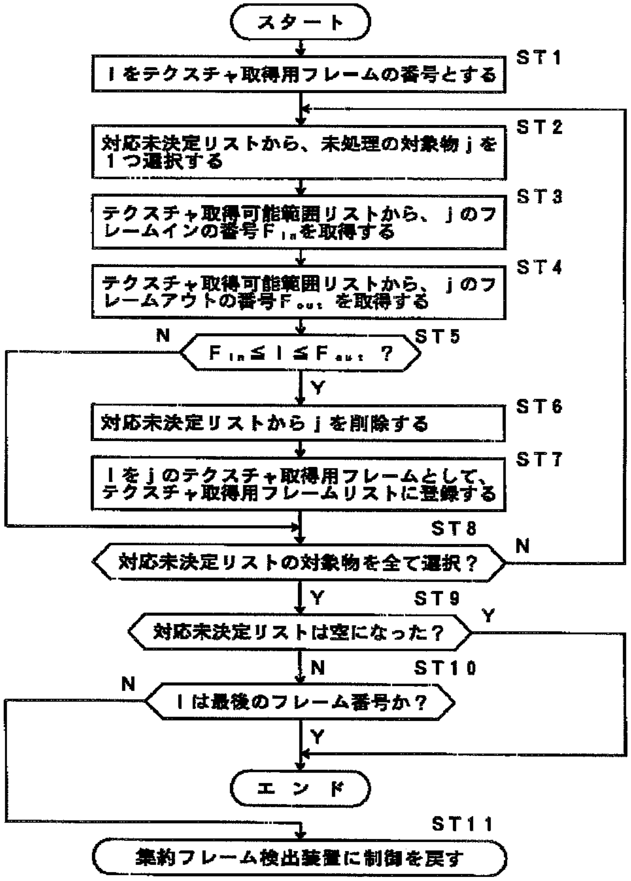
[Drawing 5]


スタート
ST1
未処理のフレーム番号の中から、最も小さいフレーム番号ｉを選択する
ST2
対応未決定リストから、未処理の対象物ｊを１つ選択する
ST3
Y
ｉがｊのフレームアウト時のフレーム番号として登録されている？
N
ST4
N
対応未決定リストの対象物を全て選択？
Y
ST5
Y
ｉは最後のフレーム番号？
N
ST6
ｉ＝ｉ＋１
ST7
対応未決定リストに登録されている全ての対象物を未処理とする
ST8
i-1をテクスチャ取得用フレームの番号とする
ST9
集約フレーム対応付装置に制御を渡す

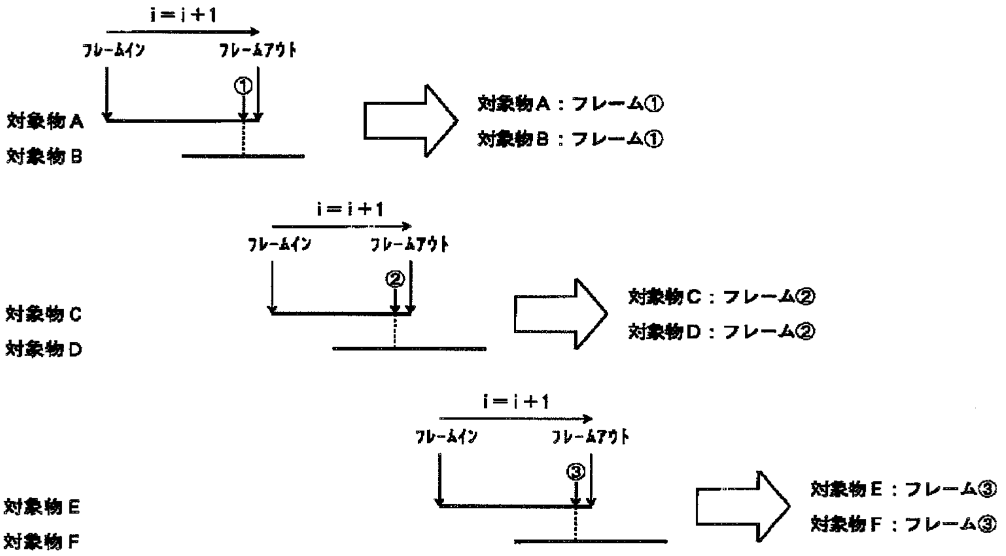
[Drawing 10]


ヘリコプター
ビデオカメラ
市街地

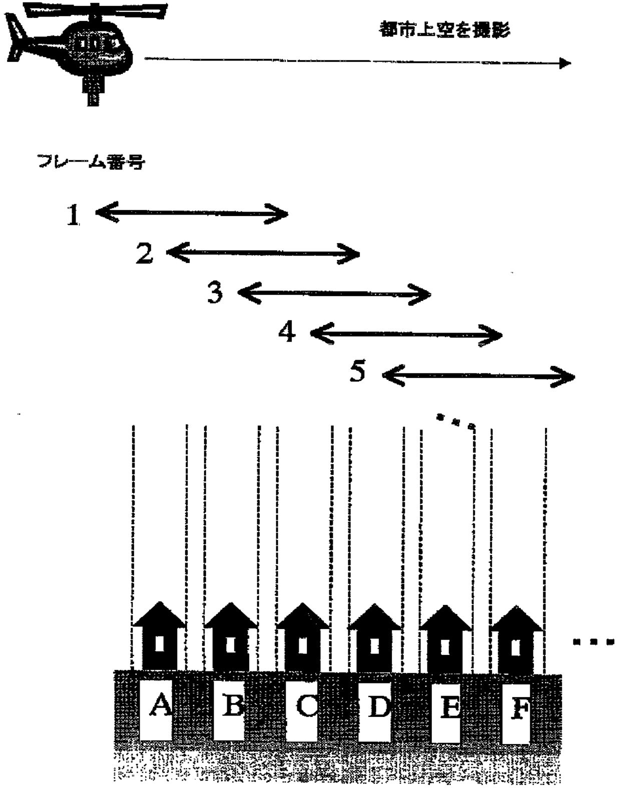
[Drawing 6]


スタート
ST1
Iをテクスチャ取得用フレームの番号とする
ST2
対応未決定リストから、未処理の対象物jを1つ選択する
ST3
テクスチャ取得可能範囲リストから、jのフレームインの番号F_inを取得する
ST4
テクスチャ取得可能範囲リストから、jのフレームアウトの番号F_out を取得する
ST5
F_in≦I≦F_out ？
N
Y
ST6
対応未決定リストからjを削除する
ST7
Iをjのテクスチャ取得用フレームとして、テクスチャ取得用フレームリストに登録する
ST8
対応未決定リストの対象物を全て選択？
N
Y
ST9
対応未決定リストは空になった？
Y
N
ST10
Iは最後のフレーム番号か？
N
Y
エンド
ST11
集約フレーム検出装置に制御を戻す

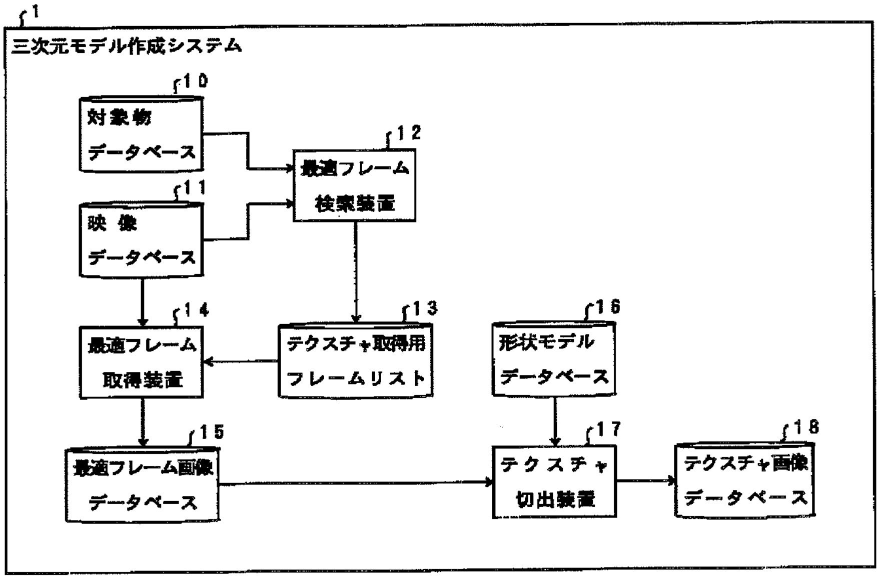
[Drawing 7]


i＝i＋1
フレームイン
フレームアウト
①
対象物A
対象物B
対象物A：フレーム①
対象物B：フレーム①
i＝i＋1
フレームイン
フレームアウト
②
対象物C
対象物D
対象物C：フレーム②
対象物D：フレーム②
i＝i＋1
フレームイン
フレームアウト
③
対象物E
対象物F
対象物E：フレーム③
対象物F：フレーム③

[Drawing 8]


都市上空を撮影
フレーム番号
1
2
3
4
5
A
B
C
D
E
F

[Drawing 11]


1
三次元モデル作成システム
10
対象物
データベース
11
映像
データベース
12
最適フレーム
検索装置
13
テクスチャ取得用
フレームリスト
14
最適フレーム
取得装置
15
最適フレーム画像
データベース
16
形状モデル
データベース
17
テクスチャ
切出装置
18
テクスチャ画像
データベース

[Translation done.]